

What is Claimed is:

1. A projection system for projecting an image comprising a matrix of pixels having modulated luminance, the projection system comprising:

a first imager configured to modulate a light band on a pixel-by-pixel basis

5 proportional to gray scale values provided for each pixel of the image to provide a first output matrix;

a second imager positioned and configured to receive the first output matrix of modulated pixels of light and modulate the individual modulated pixels of light from the first imager on a pixel-by-pixel basis proportional to a second gray scale value provided for each
10 pixel of the image; and

a relay lens system configured to focus the modulated light output from the first imager on a pixel-by-pixel basis onto the corresponding pixels of the second imager, the relay lens system including a single-gauss lens set and a mirror positioned at the system stop for the lens set to reflect the image back through the lens set.

15 2. The projection system of claim 1 wherein the relay lens system further comprises a quarter-wave plate disposed between the single-gauss lens set and the mirror.

3. The projection system of claim 2 further comprising first and second polarizing beam splitters disposed between the mirror and the second imager.

4. The projection system of claim 3 wherein the first polarizing beam splitter is
20 also disposed between an illumination source and the first imager.

5. The projection system of claim 1 wherein the single-gauss lens set comprises a single spherical lens and an acromatic lens, wherein the acromatic lens is disposed between the single spherical lens and the system stop.

6. The projection system of claim 1 wherein the relay lens system has a distortion of less than about 0.05% with an optical transfer function of greater than 0.6 at a spatial frequency of 36 cycles per millimeter.

7. The projection system of claim 1 wherein the relay lens system has a
5 magnification of between about -0.9995 and -1.0005.

8. The projection system of claim 1 wherein the relay lens system has a telecentricity with an input and output angle deviation of less than 1.05 degrees.

9. A two-stage projection system for projecting an image along a projection path, the projection system comprising:

10 first and second imagers, each comprising a matrix of pixels, with a mirror disposed in the projection path between the imagers and a single-gauss lens set having an optical axis on the projection path and disposed between the mirror and the imagers, such that the output of a first imager passes through the single-gauss lens set once in each direction along the optical axis of the single-gauss lens set focusing the output of a specific pixel of the first imager onto
15 a corresponding pixel on the second imager.

10. The two-stage projection system of claim 9 wherein the first and second imagers are LCOS imagers and first and second polarizing beam splitters are disposed between the mirror and the second imager.

11. The two-stage projection system of claim 10 wherein the first polarizing beam
20 splitter is simultaneously disposed between an illumination source and the first imager.

12. The two-stage projection system of claim 11 further comprising a quarter-wave plate disposed between the single-gauss lens set and the mirror.

13. The two-stage projection system of claim 9 wherein the single-gauss lens set comprises a single spherical lens and an acromatic lens, wherein the acromatic lens is
25 disposed between the single spherical lens and the system stop.

14. The two-stage projection system of claim 9 wherein the single-gauss lens set has a distortion of less than about 0.05% with an optical transfer function of greater than 0.6 at a spatial frequency of 36 cycles per millimeter.

15. The two-stage projection system of claim 9 wherein the single-gauss lens set
5 has a magnification of between about -0.9995 and -1.0005.

16. The two-stage projection system of claim 9 wherein the single-gauss lens set is telecentric with an input and output angle deviation of less than 1.05 degrees.

17. The two-stage projection system of claim 9 where the length of the projection system along its greatest dimension is less than 100 millimeters.